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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/828,247

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Jun-Yeob Lee

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EXAMINER

YAMNITZKY, MARIE ROSE

ART UNIT

PAPER NUMBER

1794

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	Application No. 10/828,247	Applicant(s) LEE ET AL.	
	Examiner Marie R. Yamnitzky	Art Unit 1794	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 10 October 2007.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 14-21 and 25 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 14-21 and 25 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>10 Oct 2007</u> . | 6) <input type="checkbox"/> Other: _____  |

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1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submissions filed on September 14, 2007 (amendment) and October 10, 2007 (IDS) have been entered.

2. Applicant's amendment filed September 14, 2007 cancels claims 1-13 and 22-24, and amends claims 14-16, 19, 21 and 25.

Claims 14-21 and 25 are pending.

3. The claims were previously subject to an election of species requirement. None of the pending claims read on the originally elected species (an iridium complex having three phenylisoquinoline ligands). The present claims have been fully examined on the merits.

4. The rejection under 35 U.S.C. 102(b) based on Kamatani et al. (US 2003/0068526 A1) as set forth in the Office action mailed May 17, 2007 is partly overcome by claim amendment and otherwise rendered moot by claim cancellation, as is the rejection under 35 U.S.C. 103(a) based on this reference further in view of Park et al. and Yu et al.

The rejection under 35 U.S.C. 102(b) based on Tsuboyama et al. (EP 1 239 526 A2) as set forth in the May 17<sup>th</sup> action is partly overcome by claim amendment and otherwise rendered

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moot by claim cancellation, as is the rejection under 35 U.S.C. 103(a) based on this reference further in view of Park et al. and Yu et al.

5. Claims 14 and 16-21 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claims contain subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The claims previously required L to be a bidentate ligand coordinated with carbon and nitrogen. That limitation is no longer present in claims 14 and 16-21. Chemical formulae 4, 9, 13 and 14 as shown in claim 14 do not specifically limit how a ligand of any of these formulae coordinate to the metal in L3M. This rejection could be overcome by amending the phrase "L is any one compound..." in claim 14 to read --L is a bidentate ligand coordinated with carbon and nitrogen and is any one compound...--.

6. Claims 14 and 16-21 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claims contain subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Presuming L is a bidentate ligand coordinated with carbon and nitrogen, the embodiments in which M of L3M is Pt or Zn are not enabled. Pt is divalent or tetravalent. Zn is

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divalent or monovalent. If the formula L<sub>3</sub>M represents a complete formula, coordination between three L of the formulae shown in claim 14 wherein a carbon and a nitrogen are the coordinating atoms would require a trivalent metal.

7. Claims 14 and 16-21 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

It is not clear if the formula L<sub>3</sub>M is a complete formula, given that M may be Pt or Zn and L is described in the application as originally filed as a bidentate ligand coordinated with carbon and nitrogen. Given the valence states the Pt and Zn can have, three bidentate ligands cannot coordinate to a single Pt or Zn with carbon and nitrogen to form an uncharged complex of the formula L<sub>3</sub>M.

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. Claims 14, 19 and 21 are rejected under 35 U.S.C. 102(b) as being anticipated by Igarashi et al. (US 2001/0019782 A1).

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Igarashi's iridium complex of formula (1-19) as shown on page 12 is a complex of present formula L3M wherein M is Ir and L is represented by present Chemical Formula 13. Igarashi's iridium complexes are disclosed for use in the emitting layer of an organic electroluminescent display device, and the device may have additional functional layers as required by present claim 19. For example, see paragraphs [0002]-[0010], [0135] and [0137].

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. Claims 14, 15, 19, 21 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Igarashi et al. (US 2001/0019782 A1) as applied to claims 14, 19 and 21 above, and for the further reasons set forth below.

Igarashi et al. do not explicitly disclose iridium complexes of formula L3M wherein L is represented by present Chemical Formula 4 or 9 (i.e. the iridium complexes of Chemical Formula 26 or 31 as in present claims 15 and 25), but such complexes are within the scope of Igarashi's iridium complexes and are similar to specific complexes disclosed in the prior art. Chemical Formula 4 and 9 provide naphthylpyridine ligands.

In paragraph [0043], Igarashi et al. teach that the orthometalating ligands of the iridium complexes may be aryl group-substituted nitrogen-containing heterocyclic derivatives wherein

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the aryl group may be naphthyl and the nitrogen-containing heterocycle may be pyridine.

Igarashi's iridium complex of formula (1-62) is a complex of formula L3M wherein L is similar to the ligand provided by present Chemical Formula 4, differing in that the pyridine ring of the 1-naphthylpyridine ligand of formula (1-62) is substituted with a cyano group whereas Chemical Formula 4 provides an unsubstituted 1-naphthylpyridine ligand. Igarashi's iridium complex of formula (1-60) is a complex of formula L3M wherein L is similar to the 2-naphthylpyridine ligand provided by present Chemical Formula 9, differing in that the pyridine ring is fused to a benzene ring thereby forming a naphthylisoquinoline ligand.

It would have been *prima facie* obvious to one of ordinary skill in the art at the time of the invention to make and use various iridium complexes within the scope of Igarashi's disclosure and similar in chemical structure to specific complexes disclosed by Igarashi with the expectation that such complexes would be light-emissive and suitable for the purposes taught by the prior art. One of ordinary skill in the art at the time of the invention would have reasonably expected that a complex similar to (1-62) but lacking the cyano substituent would be suitable for Igarashi's purposes since substituents are optional for the orthometalating ligands. One of ordinary skill in the art at the time of the invention would have reasonably expected that a complex similar to (1-60) but having an unsubstituted pyridine ring in place of the isoquinoline ring system would also be suitable for Igarashi's purposes given Igarashi's teachings such as in paragraph [0043].

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12. Claims 16-18 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Igarashi et al. (US 2001/0019782 A1) as applied to claims 14, 19 and 21 above, and further in view of Park et al. (US 2003/0042848 A1) and Yu et al. (US 2004/0094768 A1).

Igarashi et al. disclose an iridium complex within the scope of the phosphorescent dopant required for present claim 14, teach that the iridium complexes find use in color display devices, and teach that it is necessary to improve the properties of blue, green and red light-emitting devices in order to develop high performance color displays. Igarashi et al. do not explicitly disclose a display device having red, green and blue emitting layers meeting the limitations of present claims 16-18 and 20.

Park et al. and Yu et al. disclose full-color display devices having red, green and blue emitting layers in which at least one emitter is a phosphorescent emitter and at least one emitter is a fluorescent emitter. The blue emitting layer may be a fluorescent emitting layer. In Park's publication, for example, see Figures 4, 5 and 7-10, paragraphs [0013], [0018]-[0021], [0035]-[0040] and [0042]-[0051], and claims 1, 2, 8 and 9. In Yu's publication, for example, see Figures 1A-1E, 2A-2D and 3, and paragraphs [0001], [0037]-[0039], [0043]-[0045], [0048]-[0049] and [0059]-[0063]. The polymers taught in paragraph [0059] of Yu's publication are known fluorescent emitters.

Further with respect to the requirement of claim 20 for a hole blocking layer, Park et al. teach the use of a hole blocking layer over the phosphorescent emitter layers. For example, see paragraphs [0037] and [0040]. Note that paragraph [0040] implies that the red and green emitter layers, instead of the red and blue emitter layers, may be the phosphorescent emitter layers.



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Yu et al. also teach that an electron injection/transport layer may be deposited over each of the red, green and blue emitter layers, and materials taught in paragraph [0063] for the electron injection/transport layer include materials known in the art to provide a hole blocking function.

Further with respect to the requirement of 18 that the blue fluorescent emitting layer be formed on an upper part of red and green phosphorescent emitting layers, Yu et al. teach that the blue emitter layer may be formed over the red and green emitter layers. For example, see paragraph [0048].

A phosphorescent dopant as defined in present independent claim 14 was known in the art at the time of the invention for use in an organic electroluminescent display device as demonstrated by Igarashi et al. The further structural features of the device as required by present claims 16-18 and 20 were known in the art for full-color organic electroluminescent display devices comprising a phosphorescent dopant as demonstrated by Park et al. and Yu et al. It would have been obvious to one of ordinary skill in the art at the time of the invention to make a full-color display device using a phosphorescent dopant as taught by Igarashi et al. utilizing structural features known in the art of full-color display devices such as those disclosed by Park et al. and Yu et al.

13. Any inquiry concerning this communication should be directed to Marie R. Yamnitzky at telephone number (571) 272-1531. The examiner works a flexible schedule but can generally be reached at this number from 7:00 a.m. to 3:30 p.m. Monday-Friday.

The current fax number for all official faxes is (571) 273-8300. (Unofficial faxes to be sent directly to examiner Yamnitzky can be sent to (571) 273-1531.)

MRY  
December 12, 2007



MARIE YAMNITZKY  
PRIMARY EXAMINER

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